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Project Title	Intratissue cohabitation of commensal bacteria for immunity and symbiosis	
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Report		
<p>Research Results from the Project</p> <p>Paneth cells are intestinal epithelial cells that release antimicrobial peptides, such as α-defensin as part of host defense. Together with mesenchymal cells, Paneth cells provide niche factors for epithelial stem cell homeostasis. Here, we report two subtypes of murine Paneth cells, differentiated by their production and utilization of fucosyltransferase 2 (Fut2), which regulates $\alpha(1,2)$fucosylation to create cohabitation niches for commensal bacteria and prevent invasion of the intestine by pathogenic bacteria. The majority of Fut2⁻ Paneth cells were localized in the duodenum, whereas the majority of Fut2⁺ Paneth cells were in the ileum. Fut2⁺ Paneth cells showed higher granularity and structural complexity than did Fut2⁻ Paneth cells, suggesting that Fut2⁺ Paneth cells are involved in host defense. Signaling by the commensal bacteria, together with interleukin 22 (IL-22), induced the development of Fut2⁺ Paneth cells. IL-22 was found to affect the α-defensin secretion system via modulation of <i>Fut2</i> expression, and IL-17a was found to increase the production of α-defensin in the intestinal tract. Thus, these intestinal cytokines regulate the development and function of Fut2⁺ Paneth cells as part of gut defense.</p>		

